# SOME CRITICAL OBSERVATIONS UPON CERTAIN FORMS OF SPINAL INJURY.[1]

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IT is the purpose of this paper to direct attention to the class of spinal injuries followed by a train of vague and indefinite symptoms that are particularly manifest at remote periods of time subsequent to the receipt of the traumatism. It is customary to classify injuries of the cord and its immediate environment as follows:

(1) Those injuries affecting the vertebral cartilages and ligaments without an involvement of the cord and its membranes at the time of the accident.

(2) Vascular injuries of the cord and membranes.

(3) Injuries of the cord substance, whether demonstrable or not at the time of the accident.

Basing my opinion upon a somewhat varied and large experience and observation, I conclude that a large majority of these injuries in the region of the cord are confined in their immediate and remote manifestations to the muscles and vertebral ligaments. In a small proportion of cases we have manifest immediately, evidence of a gross cord lesion, frequently associated with a fracture or dislocation of the vertebra. In a smaller proportion of cases the evidence of a lesion to the cord may not manifest itself until some hours or days subsequent to the receipt of the injury; while in the minimum of cases the unmistakable evidence of a lesion may first appear at quite remote periods of time thereafter.

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Injuries followed by gross lesions are rarely encountered in court. A large majority of the victims perish. In the cases surviving, if accompanied with a liability, they are generally compromised before coming to trial, consequently a large majority of the medico-legal cases are of the variety known as sprains or contusions of the muscles and vertebral ligaments, and not accompanied by an injury directly or indirectly to the cord proper. It has been customary with many writers, notably Erichsen, to assert concussion of the cord as being the etiological factor in the symptomatology of the vast majority of these cases. From a period of time covering two decades the views of Erichsen have been quite generally recognized by the profession. By concussion we understand to imply an arrest, partial or complete, of the normal molecular life of the tissue. When the injury was in the vicinity of the spinal column and there was not resulting directly therefrom a gross lesion, we have generally considered any or all the varied train of symptoms resulting therefrom as due to an arrest of the normal molecular function of the cord, or spinal concussion. A large majority of the surgeons of to-day deny emphatically that the cord can be readily concussed. In cases of extreme flexion, however, where the force of the vulnerating body is crushing, we may have resulting therefrom a concussion, contusion, or laceration of the cord proper. In the latter school of cases, unfortunately for the patient, we have manifest a gross lesion, followed in a large majority of cases by early death. Hippocrates asserted that no injury to the head, however trifling, should be despised or overlooked. In Mr. Erichsen's series of lectures, first published in 1866, he applies the aphorism of Hippocrates to all injuries of the cord and its immediate environment. That the spinal column and its contents are not as sensitive to traumatisms as the brain, we fully recognize at the present day. It is differently situated and differently protected.

(1) The brain is more vascular than the cord.

(2) It is in closer proximity to the surrounding osseous walls.

(3) It is not suspended as is the cord.

(4) It is heavier than the cord, and responds more directly to vulnerating bodies.

(5) The weight, position by suspension, and protection of the cord is such that it will tolerate a traumatism that in other regions of the body, particularly the cranium, would immediately be followed by serious results.

Mr. Erichsen, with several eminent neurologists, maintains that, as a result of a molecular arrest or concussion, there resulted months thereafter grave lesions ending in death, or a varied train of symptoms pointing to functional disturbances only that renders the patient's existence most unbearable.

In the study of these cases we will do well to overlook Erichsen's concussion theory entirely, and determine the probable future behavior of a given case by an investigation of the patient's general condition of health at the time or before the receipt of the injury; likewise from a physical and psychical standpoint. It is my opinion that the very few cases terminating in lesions at very remote periods are not due to local changes, but rather due, very greatly at least, to certain dyscrasiæ or pre-existing panpathic conditions. With recent progress in the surgery of the central nervous system and nerve trunks, we have ascertained that there exists a great regularity in the repair of important nerve structures subsequent to the receipt of a traumatism. Regeneration of nerve tissue is the rule, not the exception. In some of the lower animals the entire cord is regenerated subsequent to its removal. Experience and observations convince us that the quite uniform tendency of injuries to nerve trunks is toward repair or regeneration. Particularly does this apply to the young and middle ages of life.

Confining this paper to the class of cases most frequently encountered in court and to the ones that in their subsequent behavior are the cause of the greatest amount of criticism, we must confine our attention to those cases classified as developing organic lesions at remote periods of time and those recently classified and recognized as traumatic neuroses. If we deny the concussion theory with its subsequent lesions, we would naturally infer that there occurred in those cases followed by remote lesions, one of two conditions: first, that there resulted at the time of the injury an actual cord lesion that was insignificant at the time of its receipt and was the factor in developing remote degenerative changes; or that these lesions resulted from the general shock, physical and psychical. It is my opinion that, in the small proportion of cases of spinal injury that develop a remote lesion, it is due in most cases to the minute lesion occurring at the time of the accident. If not, we are forced to admit that a trifling injury, having little or no effect upon the patient at the time of its receipt, is attended with a degenerative lesion resulting in purely functional disturbances. If the lesion develops in the latter class of cases it can only be inferred that there exists a dyscrasia or pronounced impairment of the vital forces at the time of injury. Given a normal condition of health, or a near approach thereto, the recognized tendency following the class of cases referred to in this paper is toward recovery. Given a pronounced impairment of the vital forces upon the receipt of an injury, we conceive that in a small proportion of cases we may have resulting therefrom a lesion that may develop at remote periods of time subsequent to the receipt of the injury. The exact factors leading to the result of the lesion is not fully understood; the consensus of opinion seems to be, however, to ascribe the result as greatly due to trophic innervation, particularly of the vasomotor nervous system.

To Oppenheim is given the credit of first suggesting the term *traumatic neuroses* to the class of cases particularly referred to in this paper. It is certainly easier to make an analysis of these cases under this nomenclature than by referring them to the so-called Erichsen's disease, spinal concussion, etc. It is my opinion that few, if any, of the symptoms arising in these cases can be due to a concussion, immediate or remote. It is certainly more in keeping with modern physiological and pathological views to refer the results as arising from minute cord lesions, remote changes following vasomotor defects, and to the purely neurotic condition, resulting in its most characteristic psychical features. Oppenheim has made some most valuable contributions in recent years upon these injuries so frequently followed by functional disturbances. He particularly calls our attention to the conflict in attempts at diagnosis, and the great variety and diversity of symptoms arising therefrom. Westphal refers these symptoms in a majority of cases as being due to small myelitic points and analogous to multiple sclerosis. Ziegler referred them to spinal irritation; some writers to traumatic neurasthenia; while Oppenheim changed his original views of organic lesions, which he had imbibed from his teacher, Westphal, and suggested that, in lieu of spinal concussion, we adopt the term traumatic neuroses, thereby discarding his earlier views of a lesion.

The accompanying classification by Seguin gives a fair impression of the scope of these cases not manifesting the gross lesion of the cord at the time of injury:

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| Injuries to the nervous system without evident gross lesions. Physical and psychical shock. | Immediate symptoms. | 1. Transitory paralysis.<br>2. Diabetes (mellitus or insipidus).<br>3. Amnesia (total or partial). |
| | Late or secondary symptoms. | 4. "Traumatic neuroses."<br>*a*. Psychic (depression or hypochondriasis).<br>*b*. Hysterical or neurasthenic.<br>*c*. Local or neural.<br>5. Paralytic and atrophic symptoms (sclerosis and progressive muscular atrophy); dementia paralytica; epilepsy.<br>6. Pott's disease of the spine; cerebral tumors.<br>7. Malingering. |

While we recognize that rapid progress is being made in neurology, we are forced to suggest that this branch of special work is quite far from being an exact science. A prominent neurologist in a recent paper asserts that upon the subject of spinal injuries neurologists are iconoclasts and that an authoritative book upon this subject has not been written, and that when it is written it will not emanate from the pen of a surgeon. Looking at existing literature on this topic from a surgeon's standpoint, I quite fully agree with my friend the neurologist, that an authoritative book has not yet been written. We care not its source when issued, but in the interests of justice we sincerely trust that it may soon be forthcoming. It is well known that the subsequent history of these cases after successful litigation is not in accord with the prognosis so freely volunteered by the plaintiff's expert at the time of the trial. Following a great portion of this litigation the withered limb suddenly regains its usefulness, and the crutch and cane are discarded, and at a time least expected by the public or the credulous jury. Millions of dollars have been wrongfully filched from the coffers of railway corporations in the last few years. An examination of the records of the United States and District Courts of St. Paul will reveal that in the period of one year verdicts of several hundred thousand dollars have been rendered against corporations for personal injuries. In one court verdicts amounting to fifty-five thousand seven hundred and fifty dollars appear against one railway company alone, in a period approximating one year. From the nature of the evidence in these cases the public will readily infer that the knowledge possessed of the pathology and prognosis of these cases was painfully uncertain, or that the average expert was a most unreliable witness. We are not disposed to criticise Judge Storey too sharply in dividing unreliable witnesses into three classes, as follows: "Liars, blanked liars, and medical experts."

The acute observer will ascertain upon analysis of the causes leading to the fierce criticism of the profession by the public that there are many factors that have been potent in bringing about the present situation. First, one of the principal causes lies in the unfavorable attitude of the public and bar in regard to medical evidence. This is wholly or very greatly due to the entire absence of any efficient statutes regulating the selection of experts, or the manner of eliciting evidence before the courts and jury. The regulation of expert evidence, both medical and scientific, has never been protected or regulated in America by adequate statutory enactments. In most countries the expert is selected for recognized fitness by an impartial judge. The absence of statutory regulations governing this entire subject of expert testimony places the witness of opinion upon the same footing as the witness of fact. This custom makes him subject to the same questionable privileges regarding procedure in examination that is accorded in the examination of the witness of fact. The experts or witnesses of opinion should be wholly independent of influence, and permitted to arrive at their conclusions in their own professional manner. The second greatest factor bringing about the present public sentiment undoubtedly lies in our inability to arrive at a definite diagnosis and afford a probable prognosis of a very large proportion of these cases. An element of uncertainty will continue to exist in a very large proportion of these cases. Particularly does this apply to their prognosis. If we exercise the same conservatism, however, in the witness-box that we do at the bedside there will be fewer cases of outraged justice, and the traduced name of the profession receive less opprobrium.